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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/611,589	06/30/2003	B. Michelle Chen	AMAT/1717.D2/CPES/DT/PJS	5241
7590	05/31/2005		EXAMINER	
Patent Counsel APPLIED MATERIALS, INC. P.O. Box 450A Santa Clara, CA 95052			WYSZOMIERSKI, GEORGE P	
			ART UNIT	PAPER NUMBER
			1742	

DATE MAILED: 05/31/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/611,589	CHEN ET AL.	
	Examiner George P. Wyszomierski	Art Unit 1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on \_\_\_\_\_.
- 2a) This action is **FINAL**.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 10 and 15-20 is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-9 and 11-14 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) All    b) Some \* c) None of:
    1. Certified copies of the priority documents have been received.
    2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 10/20/03.
- 4) Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: \_\_\_\_\_.

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
  - I. Claims 1-9 and 11-14, drawn to a method, classified in class 148, subclass 518.
  - II. Claims 10 and 15, drawn to a copper layer, classified in class 148, subclass 432.
  - III. Claims 16-18, drawn to an apparatus, classified in class 204, subclass 274.
  - IV. Claims 19 and 20, drawn to a computer storage medium, classified in class 703, subclass 1.

2. The inventions are distinct, each from the other because:

Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product as claimed can be made by a materially different process, such as by electroless deposition of the copper.

Inventions I and III are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the apparatus as claimed can be used to practice a materially different process, such as a process of making coated steel sheets.

Inventions IV and I are related as product and process of use. The inventions can be shown to be distinct if either or both of the following can be shown: (1) the process for using the product as claimed can be practiced with another materially different product or (2) the product as claimed can be used in a materially different process of using that product (MPEP

§ 806.05(h)). In the instant case the process as claimed can be practiced with a materially different product, i.e. the process can be manually controlled and monitored.

Inventions III and II are related as apparatus and product made. The inventions in this relationship are distinct if either or both of the following can be shown: (1) that the apparatus as claimed is not an obvious apparatus for making the product and the apparatus can be used for making a different product or (2) that the product as claimed can be made by another and materially different apparatus (MPEP § 806.05(g)). In this case the apparatus can be used to make a different product, such as a zinc coated aluminum sheet.

Groups II and IV as well as Groups III and IV are *prima facie* independent and distinct invention. No particular relationship is seen between the copper layer of Group II or the electroplating apparatus of Group III and the computer storage medium of Group IV. A case could probably be made that Groups III and IV are related as combination and subcombination, but any such relationship must be considered extremely tenuous given that the Group III claims do not even indirectly refer to a computer storage medium or a software routine.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art because of their different classification and recognized divergent subject matter, restriction for examination purposes as indicated is proper.

3. During a telephone conversation with Keith Tackett, attorney of record on May 11, 2005 a provisional election was made with oral traverse to prosecute the invention of Group I, claims 1-9 and 11-14. Affirmation of this election must be made by applicant in replying to this Office action. Claims 10 and 15-20 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

4. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

5. *Claim Interpretation*--Instant claims 5, 8, 9, 12, 13 and 14 define certain features in amounts "less than" or "up to" a given quantity. The examiner notes that prior art methods that lack these features entirely may fully meet the claimed limitations.

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1 and 2 are rejected under 35 U.S.C. 102(b) as being anticipated by Martin (U.S. Patent 4,786,337) or Ames et al. (U.S. Patent 4,904,313).

The prior art discloses electroplating copper on a substrate followed by heat treating.

The heat treatment of Martin is preferably in an air furnace, which would comprise nitrogen and

argon, and that of Ames in a "protective atmosphere". The locations where the prior art processes occur can be defined as an "integrated processing system". Thus, all aspects of the claimed invention are held to be fully met by Martin or Ames et al.

8. Claims 1, 2 and 11 are rejected under 35 U.S.C. 102(e) as being anticipated by Kitazawa et al. (U.S. Patent 6,178,623) or Uzoh et al. (U.S. patent 6,355,153).

Kitazawa column 11, lines 10-30 discloses electroplating copper on a substrate followed by treating in an atmosphere of mainly nitrogen gas at 500°C for one minute. Uzoh discloses electroplating copper followed by annealing for 15 seconds to 2 hours at a temperature of 60-450°C in an inert ambient such as nitrogen; see Uzoh column 11, lines 40-47. The locations where these processes occur can be defined as an "integrated processing system". Thus, all aspects of the claimed invention are held to be fully met by Kitazawa et al. or Uzoh et al.

9. Claims 1, 2, 3 and 4 are rejected under 35 U.S.C. 102(e) as being anticipated by Maeda (U.S. Patent 6,241,869).

Maeda column 6, lines 7-25 discloses electroplating copper followed by treating in a non-oxidative gas such as nitrogen, argon, and/or hydrogen. The locations where this process occurs can be defined as an "integrated processing system". Thus, all aspects of the claimed invention are held to be fully met by Maeda.

10. Claims 1-8 and 11-13 are rejected under 35 U.S.C. 102(a) as being anticipated by the Simpson et al. slides (reference "C12" on the attached PTO-1449 form).

The Simpson slides describe electroplating copper followed by annealing. Particularly, the slide entitled "Film Sheet Resistance Changes" discloses annealing at a time, temperature,

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and atmosphere within the limitations of the instant claims. The locations where this process occurs can be defined as an "integrated processing system". Thus, all aspects of the claimed invention are held to be fully met by Simpson et al.

11. Claims 1-9 and 11-14 are rejected under 35 U.S.C. 102(b) as being anticipated by the Sandhu et al. Advanced Metallization Conference (reference "C8" on the attached PTO-1449 form).

Sandhu discloses electroplating copper followed by annealing in an atmosphere of 95% nitrogen and 5% hydrogen for 5 minutes at temperatures within the range as presently claimed; see pp. 211-213 of Sandhu. The Sandhu atmosphere does not appear to contain any significant amount of oxygen, and the treatment atmosphere is at 0.5 psi higher than atmospheric pressure (see Sandhu page 213, which is within the range of instant claims 9 and 14. The locations where this process occurs can be defined as an "integrated processing system". Thus, all aspects of the claimed invention are held to be fully met by Sandhu et al.

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

13. Claims 5-9 and 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maeda.

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Maeda, discussed in item no. 9 supra, does not disclose the amounts of hydrogen and oxygen as presently claimed, nor does Maeda disclose the time of treatment or the gas pressure as recited in instant claims 9 and 14. However,

- a) The amounts of hydrogen and oxygen claimed fall within the purview of the Maeda disclosure, particularly in view of the fact that Maeda prefers a non-oxidative gas containing no oxygen (see Maeda column 6, line 23).
- b) The time of treatment and the gas pressure would be result effective variables, and it is not considered inventive to determine the optimum amount of a particular parameter to be used in a given process when the process steps are generally known.

Because practice of the Maeda process under the presently claimed conditions appears to be at best a routine optimization of the Maeda process, a *prima facie* case of obviousness is established between the disclosure of Maeda and the presently claimed invention.

14. Claims 9 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Simpson et al.

Simpson, discussed in item no. 10 supra, does not disclose the total gas pressure as defined in the instant claims. However, it would appear that Simpson conducts the prior art process at or near atmospheric pressure (760 torr), in the absence of any indication to the contrary, and such a pressure falls within the presently claimed range. Thus, a *prima facie* case of obviousness is established between the disclosure of Simpson et al. and the presently claimed invention.

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15. Claims 1-9 and 11-14 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-39 of copending Application No. 10/074353.

Although the conflicting claims are not identical, they are not patentably distinct from each other because while no claim of the '353 application appears to be identical in scope to any of the instant claims, both sets of claims are directed to a process of depositing copper on a substrate followed by treating in a gaseous atmosphere. The particular parameters of this treatment in the instant claims significantly overlap the corresponding parameter in the '353 claims. Because both the present claims and the '353 claims appear to perform the same process steps in the same order and for the same purpose in both cases, no patentable distinction is seen between the instant claims and those of the '353 application.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

16. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

17. The remainder of the art cited on the enclosed PTO-892 and 1449 forms is of interest. This art is held to be no more relevant to the claimed invention than the art as

applied in the rejections, supra. On the 1449 form, reference "C3" (Verteq online) has not been considered because the copy of this reference as filed was in such condition that substantial portions of the reference are illegible.

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to George Wyszomierski whose telephone number is (571) 272-1252. The examiner can normally be reached on Monday thru Friday from 8:00 a.m. to 4:30 p.m. Eastern time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King, can be reached on (571) 272-1244. Effective October 1, 2003, all patent application related correspondence transmitted by facsimile must be directed to the central facsimile number, (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



GEORGE WYSZOMIERSKI  
PRIMARY EXAMINER  
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GPW  
May 26, 2005